Tennessee Valley Authority, Post Office Box 2000, Soddy-Daisy, Tennessee 37384-2000

October 26, 2007

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

10 CFR 50.73

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 AND 2 - DOCKET NO. 50-327 AND 50-328 - FACILITY OPERATING LICENSES DPR-77 AND DPR-79 - LICENSEE EVENT REPORT (LER) 50-327/2006-001-01

The enclosed revised report provides additional conditions and corrective actions concerning the potential loss of component cooling water to the seal water heat exchanger during an Appendix R fire event. Revisions are annotated by a vertical bar to the right of the text.

This original report was submitted to NRC on April 10, 2006. The condition was reported, in accordance with 10 CFR 50.73(a)(2)(ii)(B), as the plant being in an unanalyzed condition that significantly degraded plant safety.

Sincerely,

Glenn W. Morris
Manager, Site Licensing and
Industry Affairs

Enclosure

IE22
NRR

cc (Enclosure):
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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Sequoyah Nuclear Plant (SQN) Unit 1	05000327	1 OF 6

4. TITLE

Potential Loss of Component Cooling Water to the Seal Water Heat Exchanger During an Appendix R Fire

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									SQN Unit 2	05000 328
02	09	2006	2006	- 001 -	01	10	26	2007	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE

1

10. POWER LEVEL

100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☒ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☐ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
J. W. Proffitt, Nuclear Engineer	423-843-6651

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On February 9, 2006, based on a review of an industry operating experience issue, engineering personnel identified a scenario involving a potential loss of component cooling system (CCS) water to the seal water heat exchanger during an Appendix R fire event. The scenario involves a loss of component cooling system flow to the seal water heat exchanger due to fire damage resulting in high suction temperature on the running centrifugal charging pump (CCP) causing a loss of adequate suction head (NPSH). During an Appendix R fire event, CCP suction is aligned from the refueling water storage tank (RWST), normal charging and letdown are isolated and the only reactor coolant system makeup flow is via the reactor coolant pump (RCP) seal injection flow path. If the seal water heat exchanger cooling is lost, the CCP recirculation flow and RCP seal return flow are not cooled and would mix with 30-40 gpm of cool water from the RWST resulting in concerns with pump cavitation and damage to the RCP seals. The initial evaluation of the condition focused on those fire areas where neither A-train CCS pumps were available. Subsequent investigation of the condition determined the abnormal operating procedures did not include a step to ensure an A-train CCS pump is operating for a fire in areas where only one of the A-train CCS pumps is available, since the operating pump could be affected. The cause of this event was that previous SQN fire safe shutdown analysis did not recognize the need to protect the seal water heat exchanger for hot safe shutdown, or to evaluate the ramifications of not protecting the heat exchanger. Interim compensatory measures were to post roving fire watches in the affected areas. These actions were replaced with a procedure revision to perform manual actions to ensure safe shutdown.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION	
Sequoyah Nuclear Plant (SQN) Unit 1	05000327	2006 --	001 --	01	2 OF 6

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

I. PLANT CONDITION(S)

Units 1 and 2 were operating at 100 percent power.

II. DESCRIPTION OF EVENT

A. Event:

On February 9, 2006, based on a review of an industry operating experience issue, engineering personnel identified a scenario involving a potential loss of component cooling water to the seal water heat exchanger during a 10 CFR 50 Appendix R fire event. The scenario involves a loss of component cooling system [EIIS Code CC] flow to the seal water heat exchanger [EIIS Code CB] because of fire-induced damage resulting in high suction temperature on the running centrifugal charging pump (CCP) [EIIS Code CB] resulting in a loss of adequate suction head. During a 10 CFR 50 Appendix R fire event, the CCP suction is aligned to the refueling water storage tank (RWST), normal charging and letdown are isolated and the only makeup flow is the reactor coolant pump (RCP) seal injection flow path. If the seal water heat exchanger cooling is lost, the CCP recirculation flow, approximately 60 gallons per minute (gpm) and RCP seal return flow, approximately 16 gpm are not cooled and would mix with 30-40 gpm of cool water from the RWST. The net result is that the CCP suction temperature could reach saturation temperature leading to pump cavitation. The temperature increase could be high enough to cause damage to the RCP seals. The initial evaluation of the condition focused on those fire areas where neither A-train CCS pumps were available. During subsequent investigation of the condition, it was determined the abnormal operating procedures did not include a step to ensure an A-train CCS pump is operating for a fire in areas where only one of the A-train CCS pumps is available, since the operating pump could have been affected.

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

None.

C. Dates and Approximate Times of Major Occurrences:

January 27, 2006	Engineering reviewed operating experience regarding a potential Appendix R fire scenario as described above.
February 2, 2006 at 0830 Eastern Standard Time (EST)	Precautionary fire watches established in areas potentially affected.

February 4, 2006 at 0628 EST	Precautionary fire watches were discontinued based on establishment of a procedure revision for operators to perform manual actions to ensure safe shutdown is maintained.
February 9, 2006	Engineering personnel determined the fire scenario was applicable. No other occurrences were identified where a support system should have been protected for hot safe shutdown.

D. Other Systems or Secondary Functions Affected:

No other systems or secondary functions were affected by this event.

E. Method of Discovery:

The condition was discovered during a review of an operating experience item from another utility.

F. Operator Actions:

No operator actions were required.

G. Safety System Responses:

Not applicable – no safety system response was required.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the condition was failure to protect the seal water heat exchanger from the effects of an Appendix R fire.

B. Root Cause:

The cause of the event was that previous SQN fire safe shutdown (FSSD) analysis did not recognize the need to protect the seal water heat exchanger for hot safe shutdown, or to evaluate the ramifications of not protecting the heat exchanger.

Additionally, the fire protection program upgrade project did not identify the subject scenario. The scope of the fire protection program upgrade effort did not include a re-analysis of the FSSD compliance strategies. The intent of the effort was to develop the analysis to support transformation of the operating procedures from diagnostic type formats to prescriptive fire area by fire area requirements.

C. Contributing Factor:

There were no contributing factors to this condition.

IV. ANALYSIS OF THE EVENT

The condition identified is applicable to fire areas in which the CCS is not available for cooling of the seal water return heat exchanger. Since the design of the heat exchanger is such that it can only be cooled by the A-header of CCS, the safety significance is applicable for the affected fire areas in which the CCS A-header cannot be credited for hot standby functions.

The fire areas identified include full area automatic suppression and detection systems, with the exception of the Unit 2 additional equipment building. The Unit 2 additional equipment building is equipped with 2 cross-zoned ionization detectors, 2 portable fire extinguishers, and 2 hose stations. The combustible loading in the fire area is low. In addition, the area is considered to be a low-risk fire area. Therefore, for the fire areas identified, the installed fire protection features and onsite fire department would prevent a fire from developing to the extent that there would be a loss of CCS to the seal water heat exchanger.

If a fire in one of these fire areas did result in a loss of CCS to the seal water heat exchanger, the temperature at the suction and discharge of the CCP would increase. When nominal seal injection and seal return flow rates are used, the temperature of the water at the suction of the CCP is about 200 degrees F. This suction water temperature is low enough that adequate pump NPSH is maintained. The water heats up about 20 degrees F across the pump and about another 30-40 degrees F prior to entering the RCP seals so the temperature of the seal injection water is about 250 degrees F. This seal injection water temperature is above the maximum temperature allowed for seal operation (180 degrees F), but well below the 550F design temperature of the No. 1 seal high temperature O-rings. Therefore, it is unlikely that the RCP seals would leak much above their nominal values, in which case the CCP would continue to operate and seal injection could be maintained.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION	
Sequoyah Nuclear Plant (SQN) Unit 1	05000327	2006 --	001 --	01	5 OF 6

17. NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)*

V. ASSESSMENT OF SAFETY CONSEQUENCES

Based on the above "Analysis of The Event," this event did not adversely affect the health and safety of plant personnel or the general public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

Immediate action taken was to require roving fire watches in the suspected areas until engineering completed their assessment of the issue.

As an interim action, abnormal operating procedure (AOP) N.08, "Appendix R Fire Safe Shutdown," was revised to include main control room manual actions to isolate the RCP seal return line and a local manual action to isolate the RCP seal return line for a fire in the Unit 1 6.9-kV Shutdown Board Room A, the elevation 734 access room and elevation 714 general area.

B. Corrective Actions to Prevent Recurrence:

SQN revised the applicable design basis documentation to incorporate the actions to isolate the RCS seal water return line into the applicable fire area compliance strategies and the manual action timeline analyses. In order to prevent a loss of CCS cooling to the seal water heat exchanger, AOP-N.01, "Plant Fires," has been revised to start both CCS A-train header pumps for both units. This action ensures an A-train CCS pump is operating and providing cooling to the seal water heat exchanger following a fire-DBA. Additionally, the Fire Hazards Analysis and Fire Safe Shutdown Calculations were revised to address fire areas in which only one of the CCS A or B pumps is available.

VII. ADDITIONAL INFORMATION

A. Failed Components:

None

B. Previous LERs on Similar Events:

A review of previous reportable events for the past three years did not identify any previous similar events.

LICENSEE EVENT REPORT (LER)

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
		YEAR	SEQUENTIAL NUMBER	REVISION	
Sequoyah Nuclear Plant (SQN) Unit 1	05000327	2006 --	001 --	01	6 OF 6

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C. Additional Information:

None

D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with 10 CFR 50.73(a)(2)(v).

E. Loss of Normal Heat Removal Consideration:

This condition did not result in a loss of normal heat removal.

VIII. COMMITMENTS

None.